

# **SPILOVER EFFECTS ON SDG ACHIEVEMENT: MEASURING HOW A COUNTRY'S PROGRESS TOWARDS THE SDGS IS AFFECTED BY ACTIONS IN OTHER COUNTRIES**

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## **ABSTRACT**

This paper sheds light on the significance of international spillovers in achieving sustainable development globally and emphasizes the need for collaborative efforts to address these challenges effectively. It suggests strengthening international governance mechanisms and cooperation, establishing monitoring systems to track spillovers, adopting a holistic approach to policymaking, and enhancing global knowledge-sharing and capacity-building. This paper underlines the implications of positive and negative spillovers and their relevance in the context of SDG achievement, with an objective to analyze and compare the spillover effects of the United States and India on global scarce water consumption in relation to SDG achievement. It is divided into five sections: introduction, methodology, types of spillover effects, methods and limitations in assessing Spillover effects, and final conclusions. A major contribution of the paper is to introduce the concept of spillover effects and their implications for global sustainability.

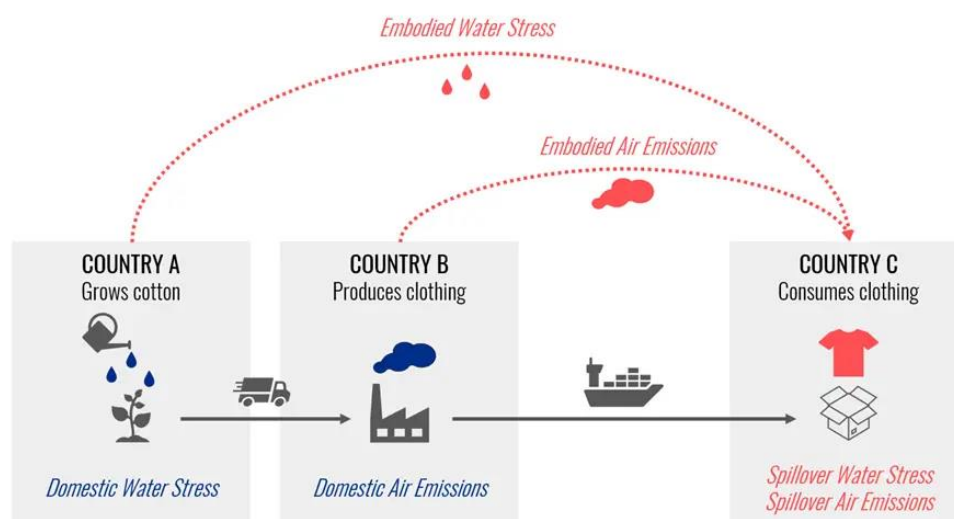
**Keywords:** Sustainable Development Goal (SDG), Greenhouse Gas Emissions (GHG), Transboundary Impacts, Policy Coordination, Negative Spillover Effects, Environmental Spillovers

## INTRODUCTION

Achieving UN SDG goals is not solely dependent on individual countries' efforts, as the actions and policies of one country can affect others. This interconnectedness, termed international spillovers, highlights the importance of understanding how the actions of one country can have global implications on sustainable development. Figure 1 illustrates these spillover effects graphically. Spillover effects refer to the unintended consequences of economic, social, or environmental policies and practices in one country that affect other countries. Examples of international spillovers include “greenhouse gas emissions that result in polar melt and rising seas, which threaten to submerge many countries and coastal communities around the world”, or the demand for commodities (such as palm oil) in one country that fuel deforestation in other countries” (Network, 2023). These effects can be positive or negative and can impact various aspects such as trade, investment, culture, environment, and social well-being. In the context of curbing negative transboundary Sustainable Development Goals (SDG) impacts, spillover effects play a crucial role. Negative transboundary impacts occur when actions taken by one country harm the sustainable development efforts and achievement of SDGs in other countries. These effects can help in identifying and addressing these negative impacts by creating awareness, promoting cooperation, and encouraging policy and action coordination among countries. As a result, these contribute to a more effective and holistic approach to sustainable development. However, “monitoring of progress towards the SDGs and national strategies largely ignore such spillovers” (SDSN Policy Brief, 2023). This is mainly because national and international databases are inconsistent, and tend not to be mandated to measure or report on international spillovers.

As a result, the impacts of spillover effects require a deeper understanding and exploration to foster sustainable development on a global scale. Identifying these effects help in addressing negative as well as positive spillover effects. This identification can help countries work towards achieving more sustainable and equitable development through mutual cooperation and best practices sharing. This understanding is critical to ensure that the global community benefits and the progress made towards SDGs isn't undermined by the actions of individual countries. The benefits of identifying spillover effects within the context of SDG achievement are broadly understood to promote knowledge and cooperation, and guide international coordination and agreements.

While promoting knowledge and cooperation it generates awareness and highlight the potential negative consequences of certain policies or practices on other countries. This knowledge helps to increase awareness among policymakers and stakeholders about the broader implications of their decisions. Based on the awareness, it also necessitates cooperation between countries to tackle shared challenges and encourage countries to work together, exchange information, share best practices, and develop coordinated strategies to address negative transboundary impacts on SDGs. As a result, these spillover effects encourage policy coordination that highlight the interconnectedness of countries and the need for policy coherence. They can push for the establishment of policies that consider potential spill-over effects and reduce negative impacts on neighbouring countries. Consequently, these provide insights for designing international agreements and frameworks that comprehensively address negative transboundary impacts. These influence the creation of mechanisms to monitor, evaluate, and mitigate spillover effects of policies on other countries' SDG attainment.



*Figure 1 Spillover Effects (Center, 2023)*

## METHODOLOGY

This paper intends to analyze the impact of spillover effects on SDG achievement by using primary and secondary data sources. It uses quantitative analysis, data collection, and analysis techniques for spillover effect assessments. Section 3 discusses the type of spillover effects. It categorizes and describes the identified types of spillover effects in detail, such as economic, environmental, social, technological, and policy spillovers. This section provides examples and

evidence from previous studies illustrating the impact of spillover effects on SDG achievement. Section 4 provides details on evaluation methods and Limitations in assessing Spillover effects. This section compares the limitations and advantages of using Multi-Regional Input-Output (MRIO) analysis, Life-Cycle Assessments (LCA) and Material-Flow Analyses (MFA) for spillover effects assessment. Based on a comprehensive literature review to identify the various types of spillover effects related to SDG achievement, the Sustainable Development Solutions Network is identified as the most reliable source of data for comparing spillover effects of United states and India for the purpose of this paper. This comparison is limited to the United states and India on generating scarce water consumption over other countries. The data sources used include relevant policy documents, statistical databases, or academic journals that contain existing research on spillover effects. Section5 summarize the main findings from the comparative analysis of spillover effects generated by the United States and India. This highlights the significance and implications of these spillover effects on global scarce water consumption and SDG achievement. As a result, it underlines the need for policy recommendations and potential actions that could minimize negative spillover effects and enhance positive spillover effects for promoting sustainable development with suggestions for further research.

## **TYPES OF SPILLOVER**

The spillover effect have different dimensions of how they can influence progress towards the SDGs positively or negatively. Positive spillovers, such as knowledge transfer and technological advancements, can enhance sustainable development across borders. However, negative spillover effects, are identified under economic crises and trade imbalances, that can impede progress. In view of these effects these are further divided under environmental spillovers, political and social spillovers and economic spillovers.

Environmental spillovers, are transboundary nature environmental challenges such as climate change, pollution, and biodiversity loss. It underscores the need for global cooperation and coordination to tackle these issues effectively. Environmental spillovers are related to natural resource use including deforestation and biodiversity loss, which are driven by trade in timber,

palm oil, coffee, rubber, soy, and other commodities (Lenzen et al., 2012; Chaudhary and Kastner, 2016; Nishijima et al., 2016; Weinzettel and Wood, 2018; Wiedmann et al., 2015), overuse of resources concerns water embodied in international trade, often referred to as “virtual water” (Hoekstra and Hung, 2002), such as the wide-spread mining of groundwater resources for export markets (Dalin et al., 2017). These environmental spillovers are divided under environmental pollution due to “international trade” and pollution due to “direct cross-border flows of pollutants in air and water”. Example of pollution due to “international trade includes electronic waste and greenhouse gas emissions. For instance, “a country may import industrial products that generate high emissions of greenhouse gases and other pollutants instead of producing them locally” (Network, SDSN Policy Brief , 2023, p. 4). Whereas, pollution due to direct cross-border flows of pollutants in air and water includes sulphur dioxide emissions from one country responsible for acid rain in neighbouring countries and transboundary water pollution, through surface waters flows.

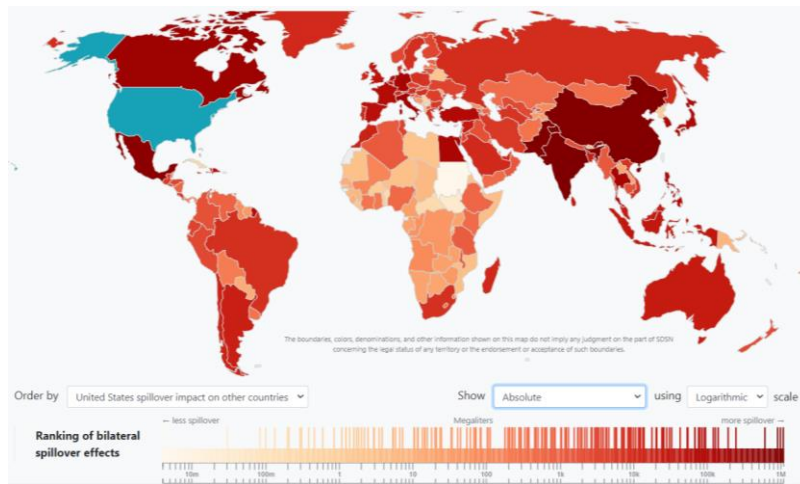
Political and social spillovers focus on the impact of migration, conflicts, and social inequalities on sustainable development. It examines how political decisions in one country can trigger consequences that spill over to others, highlighting the importance of addressing these challenges collectively. Other than these, there are socio-economic spillovers, spillovers related to finance and governance and security spillovers. The examples for these are higher labour standards in developed country and exploitation of workers in developing countries, hidden beneficial ownership of companies and related practices that allow companies and individuals to shift profits and assets out of countries in ways that are difficult to track and the investments in conflict prevention and peacekeeping, respectively.

## **METHODS AND LIMITATIONS IN ASSESSING SPILLOVER EFFECTS**

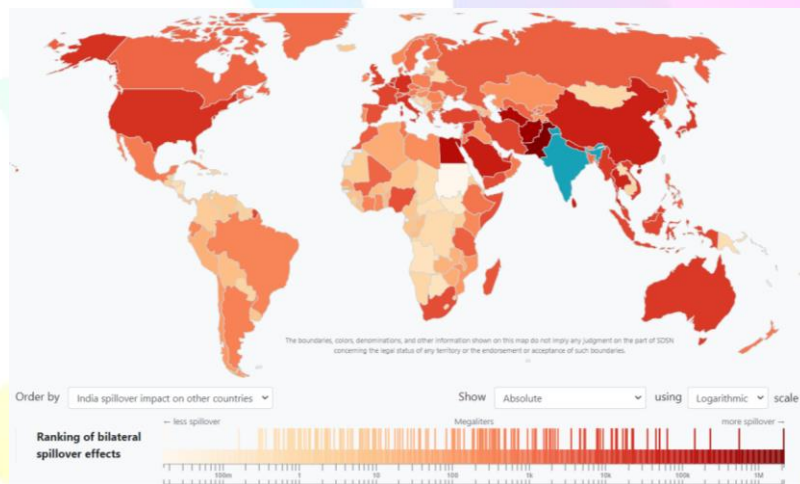
The methods for assessing international trade-related spillovers fall into three broad categories: Multi-Regional Input-Output (MRIO) analysis, Life-Cycle Assessments (LCA) and Material-Flow Analyses (MFA). MRIO combines internationally harmonized input-output tables and trade statistics for sectors or groups of products or services with “satellite accounts” of environmental resource use (e.g. land, water, timber), pollution (e.g. reactive nitrogen), or socioeconomic impacts (e.g. child labour, labour accidents, gender pay gap). This top-down

method offers comprehensive global coverage of the full supply chain. As a result, MRIO methods are best suited to assessing spillover effects of aggregate sectors or product groups at country level. On the hand, LCA method follows a bottom-up approach, conversely to the top-down approach of MRIO modelling. These are used to assess the environmental impact of individual products and their production processes across geographic and temporal scales. Increasingly, LCA are applied but LCA is not as comprehensive as MRIO. Due to data constraints, LCA is less suitable to comprehensively assess spillover effects on SDG implementation at national level, compared to MRIO. Additionally, MFA offer an additional approach for assessing spillovers, by tracking specific material flows along supply chains and across countries. This tracking can be done at high spatial resolution, but primarily for raw or less processed commodities. To some extent this limitation can be overcome by including conversion factors (e.g. from feed to livestock products). Similar to LCA, MFA also suffers from the truncation problem, so it cannot be as globally comprehensive as MRIO.

Based on these methods the spillover effects are assessed for individual countries. But this assessment experience data limitations. As per the Sustainable Development Solutions Network this assessment is limited to the following indicators: CO2 emissions, Nitrogen oxides, Sulphur dioxide emissions, scarce water consumption and fatal accidents at work. This paper compares the spill over effects of United states and India in generating scarce water consumption over other countries.



***Figure 2 How consumption in United States is generating Scarce water consumption in other countries (Network, 2023)***



***Figure 3 How consumption in India is generating Scarce water consumption in other countries (Network, 2023)***

## CONCLUSION

This research paper sheds light on the significant spillover effects on Sustainable Development Goal (SDG) achievement. It highlighted the need to understand different types of spillover, ranging from environmental to socioeconomic, to comprehensively assess their impact on SDG

implementation. By examining both positive and negative spillovers, the paper underscored the importance of accounting for unintended consequences when analysing SDG achievement. Moreover, it highlighted the need for a holistic approach to tackling spillovers, recognizing their interconnectedness and potential to hinder progress. It also underlines the methodologies and limitations in assessing spillover effects. It recognizes the complexities associated with quantifying and measuring spillovers across different domains and stakeholder groups. Acknowledging the shortage of comprehensive assessment frameworks, the paper stressed the need for further research and methodological advancements to better capture spillover effects and inform policy decisions effectively.

The comparison between the United States and India highlighted the disparities in generating scarce water resources. It emphasized the need to address asymmetries in water consumption to achieve SDG targets. This analysis further underlined the importance of national policies and international cooperation in minimizing negative spillovers. It also fosters sustainable practices in general and specific to water. This paper also identifies the immediate need to overcome data limitations which make spillover assessments uncommon. Based on the methods and data limitations, the majority of the identified spillover effects are environment-related and directly impact SDG 6, 12, 13, 14, and 15. These findings highlight the multifaceted nature of spillover effects on SDG achievement and calls for further exploration, interdisciplinary collaboration, and methodological advancements to comprehensively understand and address spillover effects. By recognizing the complexities associated with spillovers and their implications for sustainable development, policymakers and stakeholders can formulate effective strategies to ensure a better future for all.



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